



**Nuclear energy replacing fossil  
fuels to generate electricity as a  
zero-emission clean source of  
energy.**

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# LETTER OF TRANSMITTAL

[Sender's Name]

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Dear Sir/Madam;

Within the attached research proposal, it will find information regarding my selected topic: "Nuclear energy replacing fossil fuels to generate electricity as a zero-emission clean source of energy."

My research proposal includes an introduction that will brief it on the topic overall. Followed by Literature view, for which I have read 4 main thesis works that have been done in the past and a few for support of the idea that I'm pitching for the thesis.

Thank it for supervision of this proposal and thesis. And if there are any remarks or corrections to be made, let me know, and I will try my best to reduce them and make them suitable for the further work of my thesis.

[Sincerely,]

[Signature]

[Sender's name]



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## RESEARCH LINKS:

1. [https://doi.org/10.1007/978-3-030-02006-4\\_512-1](https://doi.org/10.1007/978-3-030-02006-4_512-1)
2. [https://www.researchgate.net/publication/334480164\\_Zero\\_emission\\_vessels\\_from\\_a\\_shipbuilders\\_perspective](https://www.researchgate.net/publication/334480164_Zero_emission_vessels_from_a_shipbuilders_perspective)
3. <https://doi.org/10.2478/picbe-2019-0108>
4. <https://iopscience.iop.org/article/10.1088/1755-1315/621/1/012068/pdf>

## **JUSTIFICATION:**

" Nuclear energy replacing fossil fuels to generate electricity as a zero-emission clean source of energy." is the theme I've picked for this. It is feasible to get clean, non-polluting nuclear energy. In a nuclear reaction, uranium atoms are broken apart, releasing energy. This is how power is generated: scientists discovered a technique to harness the heat from fission to generate steam, which then drives a turbine to generate electricity without emitting dangerous by-products. As a result, it may move to nuclear energy, cut emissions, and conserve natural reserves.

## **ABSTRACT**

In this paper it will be discussing; It's possible to get clean, pollution-free nuclear energy. In a nuclear reaction, uranium atoms are split apart and energy is released. This is how electricity is made: People have found a way to use the heat from fission to make steam, which then drives a turbine to make electricity without making harmful by-products.



## INTRODUCTION

For millennia, coal has been an essential part of the world's industrial revolution. In 2019, the IEA said that coal combustion would account for more than 40% of global carbon emissions and more than 75% of emissions from power production. People worldwide have grown a lot thanks to coal, but it is also the leading cause of climate change. When it comes to keeping global warming from rising more than 1.5°C above pre-industrial levels, getting rid of coal is very important. (Limpaecher, 2000)

Clean energy is moving away from sources that emit many greenhouse gases to ones that emit little or no greenhouse gases. It's hard to get rid of fossil fuels and make more low-carbon sources like hydro, solar, and nuclear power. Coal is still the world's most important source of energy. Steelmaking and heating it home both use a lot of coal. (Group, 2021)

Because of a nuclear and hydropower-based energy balance that has been in place since 2014, Ontario may be able to get rid of coal from its energy mix.

Steam is made in both coal and nuclear power plants to produce electricity. Nuclear power can be used to replace a third of the world's energy because it doesn't depend on the weather. This goes well with wind and solar, which depend on the temperature at any given time. People use baseload power when they need to keep the grid running at all times.

Over the next 12 years, all of Ontario's coal capacity will be phased out, accounting for 25% of the province's electricity generation. Ontario added 5500 MW of renewables and natural gas capacity to its energy mix by refurbishing two units at Pickering and restarting four teams at Bruce Nuclear Generating Station. This means that Ontario now has enough power to meet all its needs.

People in this 14.5-million-person province now have power that is 99 per cent carbon-free, and its energy mix makes sure the grid stays stable by using both baseload and intermittent sources. Nuclear power plants are very good at supporting variable renewables like solar and wind because they can change production based on demand and energy available on the grid. This is because nuclear power plants can be very flexible when they work. (A. Vicenzutti, 2019)

People and businesses use coal-fired boilers to heat their homes and businesses. Coal also provides energy and is used in the workplace. Nuclear power can also be used for heating, process heat, desalination, and hydrogen production. The Haiyang Nuclear Power Plant in China is set to provide heat to the whole city of Haiyang, which is a seaside city in Shandong province with more than 670,000 people. The Beznau Nuclear Power Plant in Switzerland has provided district heating to people in the area for years. (CARLOS A. REUSSER, 2020)

As the world moves away from coal, it's essential to consider how coal-dependent communities will fare. The Canada Coal Transition Initiative, among other things, has paid for a transition centre and a heavy-equipment operator training programme to make sure coal workers don't get left behind when their jobs change. According to the International Energy Agency, nine million jobs in the energy supply industry are expected to be created by 2030 because of the shift to renewable energy. This is because more and more people are using renewable energy. (Team, 2000)

## **The literature review:**

If it wants to avoid catastrophic global warming, it now needs to change the global trend of GHG emissions and make sure that it reaches zero by this century. Energy is the primary source of economic growth, but it also makes up most of the world's pollution. As a result, the world's energy system needs to be cleaned up. As a result of talks in Paris, leaders from all over the world agreed to keep global average temperature rises below two °C, with a goal of 1.5°C. People, businesses, and the government all have a part in this project. Solutions like better mineral weathering, more afforestation and reforestation, and capturing CO<sub>2</sub> from the air are needed to reach net-zero emissions. Also, energy conservation and the use of renewable sources are among them. (Salami, 2020)

Fossil fuels like heavy fuel oil (HFO) and marine diesel oil have been used for a long time to run the engines on ships (MDO). Nonetheless, this may change due to the Paris Agreement on climate change and air quality, which was signed in December 2015. Particulate matter, NO<sub>x</sub>, and SO<sub>x</sub> all come from ships and contribute to bad air near harbours than in other parts of the country (PM). Only a tiny amount of CO<sub>2</sub> emissions is currently linked to the maritime sector (3-4 per cent). That could change a lot if nothing is done because there will be a significant drop in emissions from other industries and a big rise in global shipping. IMO wants to cut CO<sub>2</sub> emissions by 50% by 2050 to fight this. As soon as possible, it needs to start working toward this goal. This may seem like a long time away, but it must begin now. It can read more about making the maritime industry carbon-neutral in this piece. People need policies that support the development of clean technology and the transportation of alternative fuels to achieve this goal. This research also says that the changes need to be made quickly because of the long lives and slow replacement of arteries. Based on how well they can be used and how bad they are for the environment; future alternative driving systems and energy sources (fuels) will be examined. It'll also see how policies affect how well a business is. The plan will be based on the total cost of ownership for each option because technology, investment and running costs, and emission rules all need to be considered. (SAIC Contractor Team, 2018)

Most people disagree on the best way to get around. They argue both scientifically and politically about getting around without using fossil fuels. Even though there have been many types of vehicles, electric cars have become the most promising for the transportation of people and goods in the future because of their technical and economic

advantages. There is a downside to the growth of electric mobility, though. The power sector needs to produce enough energy to keep up with the demand. Our goal is to look at nuclear energy use in light of the rise of e-mobility worldwide. New technologies and applications make nuclear power more efficient and consistent, so it could become one of the best ways to get energy. It is used in the research method to look at both qualitative and quantitative evaluations of new e-mobility applications and how they are likely to change. The study's novelty explains why nuclear energy is important in light of climate change and suggests possible atomic power plant repairs and renovations, which is what makes it unique. (VITIOANU, 2020)

It is essential to look into new energy after studying Energy and Environmental Engineering and current events. People in China use fossil fuels as their primary energy source because they're both cheap and easy to use. People who burn fossil fuels, on the other hand, make tiny particles that pollute the air and harm the ecosystem. Nuclear power has a lot of other benefits that the government (al, 2021) is looking at. This article looks at whether atomic energy could be used to replace fossil fuels. (Feng, 2019)

however, nuclear energy is not easy to obtain and easy to use. Because one single mistake can lead to nuclear waste, some of the radioactivity in nuclear reactor waste is going to last for a long time. There are no long-term solutions for the long-term storage of radioactive waste. Most of the waste is now stored above ground. For this reason, the nuclear industry is moving to more expensive and may be dangerous alternatives.

However, nuclear energy is expensive and can be trusted to be handed to everyone as nuclear energy can be easy access by nuclear weaponization. So, in this, nuclear energy can not be a success if it isn't being supervised over its use and the quality assurance isn't strict enough to support the program.

### **Limitations:**

- A big drop in greenhouse gas emissions intensity across the whole life cycle is needed to avoid energy cannibalism during rapid growth.
- protecting the free market from having to pay a lot of money for nuclear power by eliminating nuclear security and loitering the risks.

- People do things like mining and other things that affect the environment, like dumping radioactive waste.
- Shortly, renewable energy technologies are going to be better at both technical and economic things than nuclear power. If people don't start trusting nuclear power again, it could become obsolete.

## **Conclusion ad recommendation:**

It needs to cut back on large-scale fossil fuel use for energy production over the next few decades to be done with this transition by the end of the century. In this process, all energy sources will be looked at, and some will be used in important "niche" applications that need a lot of energy. Nuclear power plants are the only source of the vast amounts of clean and cheap energy needed to run modern industrial civilization and release very little greenhouse gas. As long as nuclear power meets the United Nations Brundtland Commission's sustainability requirements, it can be used.

Industrial countries should lead the way to the first phase of nuclear fission. They should convert most of their stationary electricity generation capacity to atomic power. In a few decades, it might be possible with the proper planning and the right incentives (as was already done by France). Such a change could significantly impact the number of greenhouse gases like carbon dioxide and methane that are released into the air around the world. (Analysis of different system design solutions for a high-power ship propulsion synchronous motor drive with multiple PWM Convertors, 2010)

There will be no way for renewable energy sources like wind and solar to provide a lot of power in the long run. Using renewable energy sources with fossil-fuel backup power isn't likely to help cut down on greenhouse gas emissions in most cases. Subsidies and laws that dilute the market to get intermittent energy sources to move to places that don't work well are wasteful. When replacing coal-fired power plants with gas-fired power plants, leakage problems make it hard to cut greenhouse gas emissions. A country's share of the world's methane leakage because of its share of imported natural gas, even if the leakage happens outside its borders, should know that it is fully responsible for these effects.

To pay for the use of their electric networks as backup power and for having to accept extra intermittent energy when it isn't needed, nearby countries might charge a grid-connection tax on countries that have a lot of intermittent energy-producing power. (Clark Lovberg S, 2003)

Especially in rural areas with no electricity grid, intermittent sources of energy that can be stored may be economically viable. Nuclear fission energy deployment will have to do a lot of "heavy lifting" to make sure this essential zero-carbon energy source lasts for a long

time. Coal, oil, and gas will have to be replaced with nuclear energy. (CARLOS A. REUSSER, 2020)

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